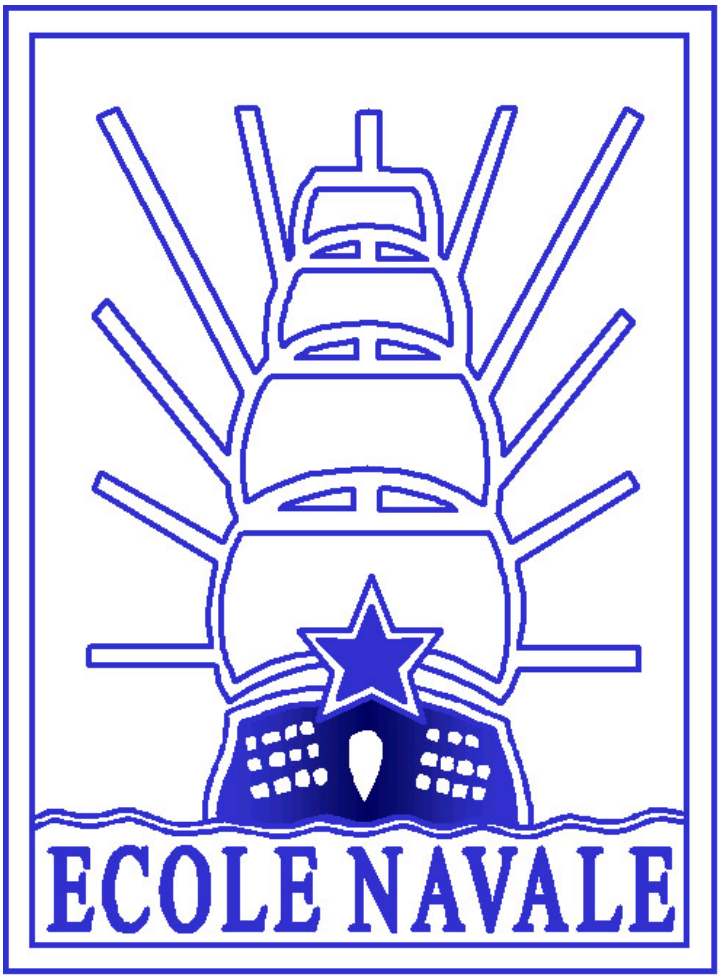
ECOLE NAVALE

EDUCATION DEPARTMENT

SECOND SEMESTER

SCIENTIFIC TRAINING BASES
TRAINING OF THE EXECUTIVE OF THE NATION



HISTORICAL REVIEW OF THE DOCUMENT

Edition	Date	References	Evolutions	Performed by
1	01/10/05		First edition	

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[1] TC (*tronc commun*) = core curriculum

INTRODUCTION

The second semester stretches over a period of 21 weeks (February – summer leaves).

The training objectives of this semester mainly dedicated to sciences are the following:

- To acquire scientific bases. The core curriculum is a compulsory syllabus for all the cadets. The objective is the learning of the tools and the assimilation of the knowledge that are necessary to approach systems;
- To select cadets among internal recruitment and foreign students for the engineering syllabus;
- To get the qualification of mechanic on the *canot major* ;
- To get the «sea sense» certificate;
- To place oneself within the Navy;
- To get the English CML1;
- To acquire synthesis methodological bases;
- To develop endurance and physical shape.

So as to balance the training on the whole semester and enable thus cadets to have a regular working rhythm, a 'standard week' system has been adopted.

It is a provisional week, which means that it defines the preferential share-out of the different subjects. Thus, these slots won't be all used and on average, each week will be generally composed of 28 teaching units (*UI*) of supervised courses which include:

- 16 for sciences;
- 7 for FHM;
- 4 for LV1 (English);
- 1 for LVE;
- 4 for sport;
- 3 for study periods.

Some adaptations could occur for this share-out depending on special circumstances (*TSGED*: Sport tournament gathering military schools, public holidays...).

Until the *TSGED*, 3 teaching units are dedicated to sport by options on the Thursday afternoon. After this tournament, this slot is cut to 2 teaching units until the end of the semester.

This standard week is made as follows:

<table>
<tr><th></th><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th></tr>
<tr><td>H1</td><td rowspan="2">TC</td><td rowspan="2">TC</td><td rowspan="2">LV1</td><td rowspan="2">TC</td><td rowspan="2">LV1</td></tr>
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<tr><td>H8</td><td>SPORT OPTION</td><td></td><td></td></tr>
</table>

TRAINING PROGRAMME OF THE SEMESTER

	Subject	HO	HNO	Coeff.	ECTS
FMI	Scientific core curriculum	276		21	30
FMM	*Canot major* skipper certificate		10		/
	Sailing		20		
FHM	Conference gathering organic commanders	12			/
	Conferences of general interest	4			
	Interview with the LVE	18			
	Communication techniques	30		5	25
	History	22		1	
	Law and institutions	30		4	
	European institutions	6			
	Public finance	6		1	
	English	70		4	
	English CML	5			
	Leadership exercise	7		3	
	Infantry marches		15		
	Parachute/Sailing course	31			
	Sport by squad	26	17	3	/
	Sport by option	32	38	1	
	Admiral running	6			
	TSGED	14	14		
Divers	Study periods	44			/
	Public holidays	42			
	Traditions *(Grand C)*	3			
	Bal preparation	10			
	Tailor	4			
	Suppleness	35			
	TOTAL	**733**	**114**	**43**	**55**

TITLE I :Seamanship training

1. OBJECTIVES

At the end of the 2nd semester, cadets must have obtained qualifications that follow:

- At least mechanic on the *canot major* and if possible *canot major* skipper certificate;
- «Sea sense» certificate.

The obtaining of sea sense and navigation bases is possible thanks to theoretical courses, a few practical sessions as well as a self-training. All these elements are then assessed by a quiz at the end of semester 2. Cadets must get a minimum mark of 16. This skipper certificate does not enable the owner to borrow a ship but is necessary to take the J80 skipper certificate.

The dinghy skipper certificate is delivered to all the cadets who own the sea sense certificate and have attended the dinghy training course.

2. DETAILED TRAINING

The 2nd semester is not composed of any courses that are part of the seamanship training. However, the cadets must keep up by themselves the learning they acquired during the first semester.
With this aim, cadets are advised to look for boarding periods on different surface ships during weekends and leaves.

To meet the objectives formulated above, the following activities are planned:

- during parachute training: 31 teaching units of sailing for cadets who does not take part in the parachuting training.
- in non-working hours (*HNO*):
    - 10 UI for *canot major* training and 12 UI for J80 training and test to get the skipper certificate, for all the cadets;
    - a sailing weekend is planned during the semester so as to reach the objectives of getting the sailing certificate and keeping up the acquired knowledge of coastal navigation.

PRACTICAL MANOEUVRE							
Code: MANPRAT	**Title**	**UI**	**Group**	**Teacher**	**Stage**	**Room**	**Obs.**
1P	Sailing corvette	HNO	class	DIRCOURS	WE sailing class		
	Theoretical test «Sea sense»	1 HNO	class	LV MAN or assistant		B 016	**HNO** After sailing WE

The training and assessment methods to get the *canot major* skipper certificate and the sea sense certificate are decided by the *DEMMAR*, the Head of the Seamanship training department .
Cadets are responsible for the follow-up of these trainings and the terms of the exams and must thus organise themselves.

TITLE II : Human and military training

This training is composed of the fields that follow:

- meeting with the 4 organic commanders of the Navy;
- parachuting training or physical hardening activity;
- practical training period to leadership (1st level) ;
- sport and participation in the *TSGED* ;
- improvement on the English level, with the objective to acquire the CML1 (or CML 2 for those who have already obtained the CML1) ;
- the acquisition of a synthesis and analysis method and its application under a written or an oral form;
- the organisation of French and European institutions as well as an introduction to public finance;
- the acquisition of main landmarks of the French military history of the 20th century and a presentation of the historian's work.

MILITARY TRAINING

1. OBJECTIVES

There are two objectives:

- to know the Navy and the operational fields in which future officers will have to serve;
- physical hardening.

2. INITIAL PROGRAMME

2.1. **Knowledge of the Navy**

Admirals that are in command of the 4 main organic bodies of the Navy will present through a conference the forces, fields of combat and the professional backgrounds of the officers who serve in them. After the conference, some round tables will be set up with the officers belonging to this body.

CODE: CDTORG	Presentation	UI
1C	Squadron vice admiral commanding the naval action force (ALFAN)	3
	Vice admiral commanding the submarine forces and strategic oceanic force (ALFOST)	3
	Vice admiral commanding the naval aviation (ALAVIA)	3
	Rear admiral commanding the special warfare officers (ALFUSCO)	3
	TOTAL	12

2.2. **Physical hardening**

Cadets that are physically fit and volunteer take part in the parachuting course organised at the School of airborne troops (ETAP) located in Pau. The other cadets take part in nautical activities which normally take place on the site of the École navale.
Moreover, three marches at night are organised during the semester.

CODE: PRODEF	Course	Concerned teachers	UI	Observations	Element
1P	Training for the parachuting licence	ETAP + 2 Prodef[2]	31 + 1 week	Departure on Monday	Fit* volunteers
2P	March theme 2	4 inst Prodef	5 HNO	In a 2-weeks slot	Class
3P	March theme 3	4 inst Prodef	5 HNO		
4P	March theme 4	4 inst Prodef	5 HNO		
	TOTAL		31 HO 15 HNO		

* This course concerns cadets who are physically fit, volunteer and whose results at the CF1 corvette are sufficient. Cadets who got results at the CF1 that are too weak will perform another corvette instead of the parachuting course.

Nota bene: The planning of this kind of training must take into account the tiredness of the cadets because of infantry marches and must thus be well-balanced compared with the courses given the next day. Marches will anyway come to an end at 1 a.m. at the latest.

[2] Prodef = Protection and defence

INTERVIEW WITH THE LVE

Cadets benefit from an interview (per squad) with the lieutenant responsible for their military and academic training. A total amount of 18 UI (about 1UI/week) is dedicated to this. While themes such as ethics and basic military training have been developed during S1, the 2nd semester deals with the following themes and interviews:

CODE	Presentation	UI
LVE	The military trade and its specific features	3
	Command, chief authority	7
	Debate on a current matter	2
	Knowledge of the Navy	3
	Additional information on jobs and possible specializations*	3
	TOTAL	18

*linked with conferences of organic commanders

PRACTICAL LEADERSHIP TRAINING

1. OBJECTIVES

Practical leadership training aims at enabling each cadet to command a team so as to fulfil a mission.
It is composed of a practical leadership exercise in the 2nd semester (Piranha exercise).

The training objective of this first exercise is the acquisition of basic methods that enable each cadet to design, prepare, brief and lead a simple mission and make then a debriefing, while being at the head of a small team.
After the presentation of methods and techniques, each cadet takes successively the command of a group so as to put into practice the provided teaching.

2. INITIAL PROGRAMME

The first practical leadership training (FPC1) stretches over a period of 7 UI during working hours. This exercise is coupled with the Navy Historical Service day which is related to the Suez crisis.

PHYSICAL EDUCATION

This semester is characterized by an intensified physical and sport training, composed of 58 UI in working hours and 55 UI in non-working hours. Those are shared out as follows:

- normal physical education by squad (26UI), orientated towards physical and sport activities of a military nature;
- muscular training (17 UI) ;
- physical education by sport option (32 UI HO + 38 UI HNO).

The participation in the TSGED is not taken into account in this share-out. It takes up 14 UI in HO and 2 days in HNO.

1. OBJECTIVES

- To develop physical capacities and especially endurance.
- To develop motor skills that are specific to sport and physical activities that are chosen.
- To get a significant level in a sport activity by means of the sport option training.
- To take part in the T.S.G.E.D.
- Physical preparation to the discovery of military diving (*DECPLOMIL*).

2. INITIAL PROGRAMME

2.1. Teaching by squad

- Based on 26 UI, this training is composed of the following activities:
  - ease in the water (assessment)[3];
  - assault course;
  - operational techniques for close intervention (*TIOR*) and combat sports;
  - pass'sport tests.
- Morning sport: A weekly session of muscular awakening (1h in HNO) is carried out by squad. These sessions are organised in the morning before the beginning of the courses and are supervised by officer cadets or midshipmen.
- Pass'sport : As each semester, pass'sport tests (Cooper test, 50-metre freestyle, 2 rope-climbing, pull-ups and press-ups) are organised. Each cadet must personally train so as to ensure progress in his results. The objective for the 2nd semester is the obtaining of an average mark of 12 out of 20 without any mark below 10.

2.2. Teaching by sport option

Training dedicated to optional sport activities is organised in accordance with the planning of the standard week.

The assessment of optional sport activities, which have been practised since the beginning of the academic year, takes place in February.

2.3. Admiral running

Three cross-country running are organised on the site during this semester (total of 6UI).

[3] including 4 UI for swimming at sea (with flippers and diving suit in neoprene) in the framework of the preparation to the military diving training period. Sessions in the swimming pool will also be useful to introduce the cadets to apnoea in the prospect of tests for becoming on-board divers.

MODERN LANGUAGES PRACTICE: ENGLISH

1. OBJECTIVES

- gain autonomy, ease and correction in the practice of the language.
- get the English (CML1) at the end of the 2nd semester (S2).
- get if possible the English CML2 at the end of S2 (for cadets who already passed the 1st level at the beginning of the semester).

2. INITIAL PROGRAMME

2.1. **Courses organisation**

According to results at the CML1 during the 1st semester, working groups of S2 are put in place (each group is made up of 12 to 15 cadets).

Preparation of both CML is based at S2 on a teaching of 70 UI, which is equivalent to about 4 UI per week. Skills that are worked on consist in:

- Written comprehension
- Written expression
- Oral comprehension
- Oral expression
- Grammar
- Phonology

Cadets who already have the CML2 (obtained at S1 or before) are exempted from these courses. They prepare a thesis on a subject given by the Languages Department instead. They are assessed on the quality of this dissertation and its oral presentation in English at the end of the semester.

They also take part in the common test at the end of the semester.

2.2. **Objective and theme**

These skills are worked on in the framework of preparation exercises for CML1 and CML2 whose indicative and non exhaustive programme is given below. Some aspects of this programme will be adapted according to current affairs or the level of the different groups:

- CML1 programme:

Talking about yourself	To introduce yourself
A place to live	To describe a place/a building/a residence
Food, drink and shopping	To be able to talk to a waiter/a shop assistant
Hobbies and sports	To talk about your hobbies and what you like doing
Travel and transport	Countries and ways of transport
The news	To understand current matters and be able to talk about them
Health	To describe an accident/symptoms
Jobs	The business world/professions
Military technology	To take and give orders/describe the military equipment

- CML2 programme:

The United Nations	To talk about UNO functions and missions
NATO	To talk about the history of NATO and its current actions
Trade	To talk about consumer society/advertising…
The media	The role of the mass media in our daily life and in current conflicts
Unemployment / the job market	To talk about unemployment and poverty
Crime and justice	To judge and express an opinion
Life in Third World countries	To talk about the difficulties of the Third world

NGOs and human rights	Human rights and the role of NGOs
Medicine : AIDS/tropical diseases…	Reactions to contagious diseases and science progress
Politics	Democracy/monarchy/current trends in Europe…

3. ASSESSMENT

Assessment takes two forms:

- To estimate the mastery level of the language in comparison with a given standard thanks to a test which is common to all the cadets at the end of the semester. It is related to 3 skills: oral comprehension, written comprehension and written expression.
- To measure the knowledge of the cadets as well as the progress they made within each group. It consists in regularly bringing a roundup of the work provided by the cadets and the level they reached, whatever the courses they attended and the level of CML they want to hit (continuous testing is organised within each group and deals with four skills).

4. GUARDIANSHIP

CML1 tests that were organised during the 1st semester made it possible to identify cadets who need a specific teaching support to help them to hit training objectives in English.

These cadets will benefit from a tutor chosen among the teachers from the Languages Department. Each cadet will also have a follow-up report book in order to:

- give additional work to cadets who need to catch up on the level that is required at the École navale;
- keep a trace of work, training periods and linguistic stays that were carried out by the cadets (integrated into the individual report book);
- write down findings of the interviews between the cadet and his tutor.

Cadets who have difficulties for this subject will be registered to take part in English training periods at Britannia Royal Naval College during leaves periods (February, Easter).

EXPRESSION AND COMMUNICATION TECHNIQUES

1. OBJECTIVES

To acquire and begin to use a working method that enables, in a professional situation, to:

- determine perfectly the outlines and implications of a subject (preliminary analysis, importance of taking into account the public's expectations, problematics) ;
- look for useful and current information on this subject (collecting of documents) and try to find some through different means;
- extract important data and ideas (selection and synthesis);
- build up a logical and methodical reasoning in a personal and autonomous manner (arguments and outline);
- to put it forward in writing (written synthesis and comments) or orally (talk), so as to enable the reader or the audience to know the outline of the subject, the point of view which is supported as well as the proposals that are made, before taking his decision.

2. INITIAL PROGRAMMME

This module is composed of 30 UI, which are normally shared out as follows:

Codes ECM	Course	Group	UI Nb	Observations
15C	Course presentation. To define the subject and draft a problematics	Squad	2	1 teacher per squad
	Oral expression methodology	Class	1	
17P	To master tools for documentary research (library, documentation centre, the Internet)	Squad	2	1 teacher per squad – specific slots for each squad
15C	To sort out the collected information and make a synthesis of it according to the problematics	Squad	2	1 teacher per squad
	To set up the outline and support it with arguments according to this problematics	Squad	2	
1C	Synthesis paper methodology	Squad	2	
2C	Training to synthesis paper	Squad	2	
3D	Synthesis written test	Class	3	
4C	Synthesis paper marking	Squad	2	
18P	Talk n°1 (free subject)	Squad	5	3 teachers per squad – specific slots for each squad
19D	Talk n°2 (compulsory subject)	Squad	6	
20C	Debriefing on talks	Class	1	1 teacher
	TOTAL		30	

The module dedicated to synthesis (ECM 1C to 4C) is apart from the rest of the training.

POLITICAL AND SOCIAL SCIENCES : LAW AND INSTITUTIONS

1. OBJECTIVES

To master the main principles of the political and administrative of France and Europe so as to:

- To place oneself as an executive of the nation ;
- To place ones action among the one of the main actors of the public life;
- To better understand the political and administrative events which are presented by the media;
- To possess strong fundamentals that enable to benefit fully from the SIGEM (S4).

2. INITIAL PROGRAMME

36 teaching units are planned for this module according to the following programme:

CODE: SPS	Themes	UI	Speakers	Group
1C	The State	2x2	Political and social sciences teacher	Squad
	The Nation	2x2		
	Democracy	2x2		
2C	A two-headed executive branch	2		
	The Parliament	2		
	Control of constitutionality	1		
3C	State authorities	2		
	Local authorities	1		
4C	Law and justice today	1		
	Jurisdictional organisation	2		
	Protagonists of the judiciary world and penal policy (lecture)	2	Attorney General	Class
5C	Judiciary matters	1	Political and social sciences teacher	Squad
	European building process	2		
	EU organization and decision-making process	2		
	Community law and European policies	2		
	Evolution of political and administrative institutions (lecture)	2	Protagonist of political or administrative life	Class
6D	Continuous assessment: written test[4]	2	Political and social sciences teacher / warrant officer	Class
	TOTAL	36		

[4] Continuous assessment for this module (coefficient: 4) includes a part related to learning acquired during the public finance module (coefficient: 1).

POLITICAL AND SOCIAL SCIENCES : INTRODUCTION TO PUBLIC FINANCE

1. OBJECTIVES

- To make a connection between the economic context and the budget of the State.
- To know the basic principles of the State budgetary functioning.
- To be introduced to the 4 stages of public finance and to the concept of public purchases.
- To discover the budget of the Navy.
- To prepare the SIGEM.

2. INITIAL PROGRAMME

All the courses (6 UI) are usually given by squad.

CODE: FIN	Themes	UI	Speakers	Observations
1C	The political and economic part: public income and expenses, balance, public interventionism	2	Officer from the EOCM (Naval Supply Officers School)	After SPS3C By squad
	Public budgetary procedure related to needs forecast until the payment of the last bill of the year. Concept of public markets.	2		By squad
	The *LOLF* (Organic Law on Finance Laws). The budget of the Navy.	2	Head of the Navy headquarters/PL/FIN office	Class Before SPS 6D
	TOTAL	6		

Nota bene: Continuous assessment of the learning acquired in this module (coefficient: 1) will be integrated into the «Law and institutions » module test (coefficient: 4).

POLITICAL AND SOCIAL SCIENCES: MILITARY HISTORY

1. OBJECTIVES

- To place the history y of the French Navy in a larger perspective, i.e. the history of the French Defence;
- To give an outline of the development of National Defence structures;
- To provide elements of general knowledge;
- To understand the role played by military written work in the formation of history and be introduced to historical work on archives.

2. INITIAL PROGRAMME

The 22 UI are usually given in lecture halls and with the whole year. They are organised in the following manner: 13 UI of lectures + 2 UI of tests + 7 UI dedicated to the Defence Historical Service day (alternation with the FPC1 exercise by watch).

HIS CODE	Type	UI Nb	Subject	Speaker
1C	Course	4	**The French military power from 1914 to 1945** - to give a reminder on the main military stages of WW I; - to explain the priority given to a mainland and terrestrial defence after 1919; - to explain the chaos which occurred in France in 1940.	History teacher
2C	Course	3	**The French defence system faced with colonial wars (1945-1962)** - to detail the reconstruction of French armies after 1945: goals and methods; - to study the antagonistic link between political decision and military action during colonial wars.	
	Course	3	**The French defence policy since 1962 : the Gaullist heritage and post- Cold War evolutions (I)** - to explain the reconstruction of the French defence apparatus in the 1960s around the concept of dissuasion; - to analyse the political and military decision-making process through a few current historical examples (Chad, First Gulf War)	
	Course	3	**The French defence policy since 1962 : the Gaullist heritage and post- Cold War evolutions (II)** - to explain the transition to a professionalization of the armies; - to draw up historical prospects for a Europe of Defence.	
3D	Test	2	Test on acquired learning	History teacher, warrant officers
4P	TD[5]	7	Defence Historical Service day – SUEZ exercise. Work on archives, role of ship's documents and mission reports in the knowledge and interpretation of facts.	Speakers from the Defence Historical Service
TOTAL		22		

[5] TD = Tutorial

TITLE III: Engineering training

1. OBJECTIVES

The general objective of this part of the training is to provide cadets with basic scientific knowledge that is necessary for all the naval officers and the continuation of the schooling. With this aim, teachers will illustrate their courses as soon as possible by applications linked with seamanship training. Cadets must also be able to grasp the physical factors rough estimates.
Each module from this course has a specific objective, which is defined later.
Some specific modules constitute the logical continuation of courses belonging to ship and energy training which were given at the first semester.

2. DÉTAILED TRAINING

Core curriculum is divided into 4 different groups of scientific subjects which gather 276 UI :

- *Systems technologies*
  - Engineer techniques;
  - Naval architecture;
  - Electric engineering;
  - Automatic systems technology.
- *Signals and systems*
  - Signal treatment bases;
  - Automation and sequential automatic systems;
  - Measures and sensors.
- *Organisation - methods*
  - Project management;
  - Operational statistics and maintenance.
- *Computer sciences*
  - Programming and algorithms;
  - Computer systems architecture.

Each module is composed of 22 UI of courses and 2 UI dedicated to assessment, except statistics and operational maintenance module which is based of 33 UI of courses and 3 UI for assessment.

3. NECESSARY PERSONAL WORK

The table below runs over the following elements for each module of the scientific core curriculum:

- the share out of instruction units that are planned between courses, tutorials, practical and tests;
- an estimation by the teachers of the personal working time that is necessary for cadets so as to correctly understand the teaching at the academy.

Course title	Ref.	Course	TD	TP[6]	Test	Cadets personal working time		
						minimal	nominal	maximal
Engineer techniques	TC1	12	10	0	2	8	12	22
Programming and algorithms	TC2	6	16	0	2	5	10	16
Naval architecture	TC3	10	12	0	2	6	9	12
Measures and sensors	TC4	14	8	0	2	8	12	18
Computer systems architecture	TC5	10	12	0	2	5	10	15
Electric engineering	TC6	12	10	0	2	6	10	15
Automatic systems technology	TC7	12	10	0	2	5	10	15
Signal treatment bases	TC8	10	12	0	2	10	15	20
Project management	TC9	12	6	4	2	2	3	4
Automation and sequential automatic systems	TC10	11	11	0	2	5	10	16
Maintenance	TC11	18	15	0	3	4	6	8
Operational statistics						4	6	12
TOTAL		**276 h**				**60 h**	**101 h**	**151 h**

[6] TP = practical

TC1 – ENGINEER TECHNIQUES

Teaching Department : Mechanics -energy

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Course of the teaching: • Course: ¼ of a class • TD: ¼ of a class • TP: none
Prerequisite courses: none
Courses or Modules for which this module is necessary : ship and energy training (S6)

1. COURSE OBJECTIVE

Technical design is a tool that is often favoured by the engineers. It corresponds to a need for comprehension and representation of systems that become more and more complex. It can be considered as efficient and useful when all its elements are clearly and rapidly understandable and when the memorization is easy.
The objective of this module is to acquire a basic knowledge related to: technical designs reading, mechanisms analysis, technical vocabulary and usual technical solutions for guidance, water-resistance and power transmission.

Students know-how at the end of the course:
This teaching enables the spreading of a technical culture and enlighten choices in the field of careers guidance.
Students will be able to extract an element from an overall design. They will have to know the basic technical vocabulary and to be able to read a nomenclature. Finally, they will be able to approach mechanisms linked to simple cinematics such as angle refraction.

Connections with other courses:
It deals with the teaching of non-specialized skills and knowledge that constitute the basis on which professional training will rely. Education leans on a reference professional field which is precise, even if the courses are crossed in terms of content (description tools, approaches, methods…).

This course enables future officers to approach the ship and energy training at S6.

2. DETAILED TEACHING PROGRAMME

Level testing (1h) 1 month before the course

1. General presentation and standard
2. Views and sections
3. Standardised elements
4. Pieces extraction
5. Mechanisms analysis

CODE	UI	Type	Title	Room
TECHING	2	Course	Additional elements	Squad
	2	Course	Additional elements	
	2	TD	Additional elements	
	2	Course	Mechanisms analysis	
	2	TD	Mechanisms analysis	
	2	Course	Mechanisms analysis	
	2	TD	Mechanisms analysis	
	2	Course	Mechanisms analysis	
	2	TD	Mechanisms analysis	
	2	Course	Mechanisms analysis	
	2	TD	Mechanisms analysis	
	2	Test	Assessment	B016

Constraints:
This course belongs to the first part of scientific courses. Courses and tutorials will be planned for each ¼ of class in parallel with the TC2 course.

TC2 – PROGRAMMING AND ALGORITHMS

Teaching Department: Computer sciences.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Course of the teaching: • Course: 2 groups of cadets having the same level, by ½ a class (see constraints) • TD: same groups • TP: none
Prerequisite courses: none
Courses or Modules for which this module is necessary: none

1. COURSE OBJECTIVE

To lead officer cadets to solve an engineering problem using computers, first, through the learning of methods enabling to break up this problem in different tasks, expressed in a formal language (algorithmic), and then through the knowledge of a programming language (C/C++ language) which permits them to solve it.

Students know-how at the end of the course:
To break up an engineering problem into a series of basic tasks that can be fulfiled by a computer. To design a simple programme in the C/C++ programming language.

Connections with other courses:
This course is an introduction to the information technology option. It will enable each cadet to get basic knowledge that is necessary in the field of programming so as to approach their project for the in-depth course (S4) as well as their final studies project (S5).

2. TEACHING DETAILED PROGRAMME

Level testing (1h) one month before the course

CODE	UI	Type	Title	Room
PROG	2	Course	Introduction and general matters	Squad
	2	Course + TD	Simple and structured instructions	Squad
	2	TD	Simple and structured instructions	Squad
	2	TD	Simple and structured instructions	Squad
	2	TD	Simple and structured instructions	Squad
	2	Course + TD	Tables	Squad
	2	TD + Course	Tables	Squad
	2	Course + TD	Functions	Squad
	2	TD	Functions	Squad
	2	TD	Functions	Squad
	2	TD	Functions	Squad
	2	Test	Written test	B016

Constraints:
To be planned before the module dedicated to computer systems architecture (TC5) and in parallel with the engineer techniques module (TC1) (by ½ a class).

TC3 – NAVAL ARCHITECTURE

Teaching department: Mechanics –energy

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: 1/4 a class • TP: none
Prerequisite courses: none
Courses or Modules for which this module is necessary: Maritime engineering in-depth course

1. COURSE OBJECTIVE

- To describe mechanical principles that govern ships stability.
- To manage daily stability on board a ship.
- To give an estimate of the residual stability of a ship after a damage.

Students know-how at the end of the course:

- To calculate the daily stability of the ship and give an estimate of the stability after a damage.
- To deal rapidly with the follow-up of stability on board a ship.
- To evaluate risks linked with different types of damages.

Connections with other courses:

This module is completed by other modules that are part of the Maritime engineering in-depth course.

2. TEACHING DETAILED PROGRAMME

1. Euler's theorem and stability couples
2. Weights movings and mobile weights
3. Float with large dips
4. Isoclinals
5. Voluntary strandings and stability criteria

CODE	UI	Type	Title	Room
ARCHNAV	2	C		lecture hall
	2	C		lecture hall
	2	TD		squad
	2	TD		squad
	2	C		lecture hall
	2	C		lecture hall
	2	TD		squad
	2	TD		squad
	2	C		lecture hall
	2	TD		squad
	2	TD		squad
	2	Test		B016

Constraints:

This course is to be planned in parallel with the TC5 course dedicated to computer systems architecture.

During tutorials, half a class of cadets will be in TC5 and the other half in TC3 (because of the computer rooms occupancy planning scheme).

TC4 - MEASURES AND SENSORS

Teaching department: Mechanics – energy.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: ¼ of a class • TP: none
Prerequisite courses: Electrical engineering TC
Courses or Modules for which this module is necessary: Maritime engineering in-depth course

1. COURSE OBJECTIVE

Cadets must get a basic knowledge for the different kinds of sensors that are used to measure temperatures, positions, forces and accelerations. They must be made aware of sensors manufacturer features, of precautions they have to take when choosing a sensor. They must also take into account the random aspect of mismeasuring.
To approach this course in good conditions, cadets must have beforehand acquired good bases in mathematics (complex variable, solutions to differential equations, limited developing), electronics as well as in different fields of physics such as mechanics or electromagnetism.

Students know-how at the end of the course:
- To choose a sensor or define its favoured features
- To evaluate a chain of acquisition and determine possible sources of mismeasuring
- To know the different types of sensors and the magnitude of their preciseness
- To diagnose the origins of an acquisition system malfunctioning

Connections with other courses:
Knowledge that is presented in this course is useful for all the scientific and technical fields. This course enables officer cadets to acquire a specific vocabulary. At the end of the teaching, they are aware of measuring difficulties. They are able to diagnose a malfunctioning on a measuring chain.

2. TEACHING DETAILED PROGRAMME

1. Sensors features, mismeasuring
2. Different types of sensors
3. Measures of the diverse magnitudes

CODE	UI	Type	Title	Room
MES	2	C		lecture hall
	2	C		lecture hall
	2	C		lecture hall
	2	TD		squad
	2	C		lecture hall
	2	C		lecture hall
	2	C		lecture hall
	2	TD		squad
	2	C		lecture hall
	2	TD		squad
	2	TD		squad
	2	Test		B016

Constraints : Regular planning (2 to 4 sessions of 2h) per week.

TC5 – COMPUTER SYSTEMS ARCHITECTURE

Teaching Department: Computer science.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: ¼ of a class • TP: none
Prerequisite courses: TC 2
Courses or Modules for which this module is necessary: computer science option

1. COURSE OBJECTIVE

The objective of this course is to provide cadets with skills and technical bases that are necessary so as to understand how computer tools function. The course is notably illustrated by references to architectures that are used in the French Navy.

Students know-how at the end of the course:
At the end of the course, cadets will be able to describe the theoretical and practical content of a computer and put it in a naval environment.

Connections with other courses:
Basic knowledge in the field of programming will be necessary for some kinds of tutorials. This is why this module must be planned after TC2.

2. TEACHING DETAILED PROGRAMME

CODE	UI	Type	Session	Room
ARCHSI	2	C	Historical review	Lecture hall
	2	C	Complex systems and computers	Lecture hall
	2	TD	Complex systems and computers	info *2
	2	TD	Complex systems and computers	info *2
	2	C	Operating systems	Lecture hall
	2	C	Operating systems	Lecture hall
	2	TD	Operating systems	info *2
	2	TD	Operating systems	info *2
	2	C	Computer architecture	info *2
	2	TD	Computer architecture	info *2
	2	TD	Computer architecture	info *2
	2	Test		B016

Constraints:
During tutorials, half a class of cadets will be in TC5 and the other one in TC3 (because of the computer rooms occupancy planning scheme).

TC6 – ELECTRIC ENGINEERING

Teaching department: Mechanics – energy.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: ¼ of a class • TP: none
Prerequisite courses: Ship and energy training (S1)
Courses or Modules for which this module is necessary: Energy engineering in-depth course and Ship-energy course unit (S6)

1. COURSE OBJECTIVE

To provide cadets with basic knowledge in the field of asynchronous machines, alternators and transformers: principles, use, functioning limits and applications.

Students know-how at the end of the course:
To know the functioning principle of asynchronous machines, alternators and transformers as well as their applications.

Connections with other courses:
This course (part of the core curriculum) follows the introduction to naval electrotechnics which was done duringthe first semester in the framework of seamanship training (basic training). This includes themes such as distribution, single-phase and three-phase systems. This course enables officer cadets to understand the functioning principle of electronic equipments. This course, issuing from the core curriculum, is a prerequisite to electrotechnics courses of the 6th semester (seamanship training) and to Energy engineering optional and in-depth courses.

2. TEACHING DETAILED PROGRAMME

1. Single-phase transformator : principle, equivalent scheme, functioning.
2. Alternating machines principles: concept of poles' number of pairs, turning field.
3. Synchronous machine: alternator, model with constant reactance, network coupling, limits of functioning.
4. Asynchronous machine: principle, sliding, equivalent diagram, sea applications, starting methods.

CODE	UI	Type	Title	Room
ELEC	2	Course		Lecture hall
	2	Course		Lecture hall
	2	TD		Squad
	2	Course		Lecture hall
	2	Course		Lecture hall
	2	Course		Lecture hall
	2	TD		Squad
	2	TD		Squad
	2	Course		Lecture hall
	2	TD		Squad
	2	TD		Squad
	2	Test		B016

Constraints : **None**.

TC7 – AUTOMATIC SYSTEMS TECHNOLOGY

Teaching department: Mechanics – energy.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: ¼ a class • TP: none
Prerequisite courses: none
Courses or Modules for which this module is necessary: none

1. COURSE OBJECTIVE

To provide cadets with tools and knowledge that are important so as to understand an hydraulic or pneumatic installation. They have to know what an automated system is: types of starting systems and control line. This training is completed by a presentation of industrial programmable robots.

Students know-how at the end of the course:
To be able to read and calculate the different parameters of a simple hydraulic circuit. To recognize standardized elements on a given scheme and infer a nomenclature from them. To know the functioning principle of these elements. To know basic principles of hydrostatic circuits. To know the functioning principle of a programmable robot as well as its role in an automated system. To know funtioning principles and limits of pneumatic-power elements and circuits.

Connections with other courses:
This course may be completed by a training in the field of automation as well as fluids and structures mechanics. The course dedicated to programmable robots programming could be planned later. A specific course on pumps will complete it.

2. TEACHING DETAILED PROGRAMME

1. General presentation of automatic systems
2. Combinative logic
3. Pneumatic technology
4. Hydraulic technology
5. Programmable robots

CODE	UI	Type	Session	Room
TECHAUTO	2	C		Lecture hall
	2	C		Lecture hall
	2	TD		Squad
	2	C		Lecture hall
	2	TD		Squad
	2	C		Lecture hall
	2	C		Lecture hall
	2	TD		Squad
	2	TD		Squad
	2	C		Lecture hall
	2	TD		Squad
	2	Test		B016

Constraints: Regular planning (2 to 4 sessions of 2h) per week.

TC8 – SIGNAL TREATMENT BASES (BTS)

Teaching department: Signal and Acoustics

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: ¼ of a class • TP: none
Prerequisite courses: none
Courses or Modules for which this module is necessary: Waves and signals option

1. COURSE OBJECTIVE

This course approaches the main concepts of signal treatment (only determinist signals will be studied). After reminders on Fourier series, concepts of energy and power will be presented, as well as as Fourier integral and its specific features. Then, thanks to the study of the convolution product, functions such as intercorrelation and autocorrelation will be determined so as to create a link with the whole detection system.

Students know-how at the end of the course:
To know the usefulness and characteristics of the Fourier integral. They must be able to know how to use basic principles: operations on simple signals, concept of energy, correlation principle.

Connections with other courses:
This course is fundamental for the "Waves and signals" option, the submarine acoustics in-depth course as well as the signals and systems modules that are part of the Professional Masters.

2. TEACHING DETAILED PROGRAMME

1. Signals classification
2. Reminders on Fourier series
3. Fourier integral (Dirichlet theorem and general characteristics - Distribution)
4. Convolution product and filtering
5. TF examples and applications
6. Correlation (autocorrelation – intercorrelation – Wiener Kintchine theorem and DSP)

CODE	UI	Type	Session	Room
BTS	2	C	Signals classification – Fourier series	Lecture hall
	2	C	Fourier integral	Lecture hall
	2	TD		Squad
	2	C	Convolution product and filtering – TF examples	Lecture hall
	4	TD		Squad
	2	C	Correlation (1/2)	Lecture hall
	2	TD		Squad
	2	C	Correlation (2/2)	Lecture hall
	4	TD		Squad
	2	Test		B016

Constraints: Regular programming (2 to 3 sessions of 2h) per week.

TC9 – PROJECT MANAGEMENT

Teaching department: All.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,0

Teaching course: • Course: ¼ a class • TD: ¼ a class • TP: ¼ a class (see constraints)
Prerequisite courses: none
Courses or Modules for which this module is necessary: All projects: PIA, PVA, PFE, ship and energy case studies

1. COURSE OBJECTIVE

To enable each cadet to have at his disposal possibilities so as to organize his work around a project, set up and assess a technical proposal and to acquire writing bases that are necessary for a report. It also deals with consciousness-raising in the field of technical programmes implementation.

Conferences given by external speakers will bring concrete examples of how to conduct large-scale projects.

Students know-how at the end of the course:
Cadets will be able to organize and plan a project (industrial or not), by taking into account constraints such as objectives, time, costs… They will know how to use support tools for projects management and be aware of writing criteria as far as technical and scientific reports are concerned.

Connections with other courses:
This teaching is preparatory to the different projects that cadets have to conduct during their schooling and even after.

2. TEACHING DETAILED PROGRAMME

CODE	UI	Type	Session title	Room
PROJET	2	C	Presentation	Squad
	2*2	C	Project formalizing and modelling	Squad
	3*2	TD	Project formalizing and modelling	Squad
	2	Conference		Lecture hall
	2	C	Organization, stages, public market	Squad
	2	C	Systemic approach and writing constraints	Squad
	2*2	TP	Software	Info
	2	Test		B016

Constraints:
Practical sessions must be planned in computer rooms located in the Bougainville building or, in case of planning conflicts, in squad rooms that are equiped with computers.

TC10 – AUTOMATION AND SEQUENTIAL AUTOMATIC SYSTEMS

Teaching department: Mechanics - energy and signals - acoustics.

Number of ECTS credits for a mark >= to 10/20 in this module: 1,5

Teaching course: • Course: class • TD: ¼ a class
Prerequisite courses: TC7
Courses or Modules for which this module is necessary: Automation course, waves and signals option, auditor syllabus

1. COURSE OBJECTIVE

Thanks to two steps, the objective is to provide cadets with tools and knowledge that are necessary to grasp an atomated installation. First, they benefit from the analysis and representation method for sequential systems: the GRAFCET. Then, automatic control as well as control factors are also presented to them.

Students know-how at the end of the course:
As far as the part dedicated to sequential automatic systems are concerned, cadets will have to be able to present the functioning of a sequential automatic system thanks to a Grafcet and to identify actions and receptiveness of this system.

Concerning the automation part, cadets will be able to set up and calculate the transfer function of a simple automatic system. They will have to know automatic cotrol modelling in open loop and in closed loop.

Connections with other courses:
This course will be a prerequisite to the "automation" option and the "automation" course issuing from the auditor syllabus. It must bring cadets the capacity to assess functioning factors of an automatic system. It completes concepts that were acquired during the "automatic systems technologies" core curriculum.

2. TEACHING DETAILED PROGRAMME

CODE	UI	Type	Session	Room
AUTO	2	C	Introduction and Grafcet	Lecture hall
	2	TD	Grafcet tutorial	Squad
	2	C	Grafcet	Lecture hall
	1	TD	Grafcet tutorial	Squad
	1	C	Introduction to automation	Lecture hall
	2	TD	Grafcet tutorial	Squad
	2	C	Study of linear systems and Laplace integral	Lecture hall
	2	TD	Automation tutorial	Squad
	2	C	Response of a linear system in open loop	Lecture hall
	2	TD	Automation tutorial	Squad
	2	C	Response of a linear system in closed loop	Lecture hall
	2	TD	Automation tutorial	Squad
	2	Test		B016

Constraints:
This module is composed of two successive parts. The first one is made of 9h (4h C and 5 h TD), and the other one of 13 h (7h C and 6h TD). Each part is taught by a different teachers team.

TC11 – OPERATIONAL STATISTICS AND MAINTENANCE

Teaching Department: Mechanics – energy.

Number of ECTS credits for a mark >= to 10/20 in this module: 2,0

Teaching course: • Course: class • TD: ¼ of a class • TP: none
Prerequisite courses: TC7
Courses or Modules for which this module is necessary: Ship and energy training (S6) and projects

1. COURSE OBJECTIVE

1.1. Probabilities and statistics

To provide cadets with bases and main principles of probabilities theory, which will enable them to approach statistics issues that are necessary in different fields of the Navy (random signal, information, reliability and also populations theory or econometry).

Students know-how at the end of the course:
To model a simple random problem and put it in a environment made of probabilities. To know the main random variables, their fields of application and features; it will be especially important to know perfectly the Laplace-Gauss law with one or several dimensions, as well as the limit central theorem, which constitutes the main result of this course and the basis of all statistic theories.

1.2. Maintenance

To provide cadets with concepts such as industrial organization in the field of maintenance and make them know choice approaches that are linked with the maintenance function.
To study the concepts of different types of maintenance.
Finally, to detail the general organization that is used by the Navy headquarters so as to maintain the different maritime forces' elements in an operational shape (conferences).

Connections with other courses:
To know analysis tools for a functional approach. To have at one's disposal organization tools in addition to project management and know how to formalize activities related to the maintenance function.

To be able to implement an AMDEC procedure. To know how to calculate a failure rate.

2. TEACHING DETAILED PROGRAMME

Constraints:
This course will belong to the first part of scientific courses. Courses and tutorials will be planned for each ¼ of class.

2.1. **Probabilities and statistics**

CODE	UI	Type	Session	Room
STAT	2	C1	General matters – probabilities – conditional probabilities	Lecture hall
	2	TD1	Conditional probabilities	Squad
	2	C2	Random variables – random variables features – laws study	Lecture hall
	2	TD2	Random variables laws – usual law	Squad
	2	C3	Random vectors	
	2	TD3	Random vectors laws – independence and correlation	
	2	C4	Convergence modes – large numbers' law – limit central theorem	
	2	C5	Statistics notions – assessment theory	
	2	TD4	Assessment: methods of maximal likelihood and confidence intervals	
	2	C6	Tests and statistics theory	
	2	TD5	Henry straight line – Bayes methods, Neyman and Pearson methods – χ^2 test	
	2	Test	Assessment	B016

2.2. **Maintenance**

CODE	UI	Type	Session	Room/group	Observations
MAINT	2	Course +TD	Pareto	Lecture hall + squad	
	2	Course	Maintenance methods – R – MTBF	Lecture hall	After TD2 (STAT)
	2	Conference	SSF	Lecture hall	
	2	TD + course	R – MTBF – Weibull	Squad + lecture hall	After C6 (STAT)
	2	TD	Weibull	Squad	
	1	TD		Squad	
	1	Test		B016	